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09/623,023	10/20/2000	Keiji Hashimoto	107016	5472

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
1745	8

DATE MAILED: 04/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/623,023

Applicant(s)

HASHIMOTO ET AL.

Examiner

Susy N Tsang-Foster

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 15 and 16 is/are rejected.
- 7) ☒ Claim(s) 13, 14 and 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7. 6) ☐ Other: _____

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DETAILED ACTION

Preliminary Amendments

1. The preliminary amendments filed on 8/25/2000 and 9/20/2000 have been received and entered in the file.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement submitted on 11/30/2000 has been considered by the examiner.

Drawings

4. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 21b4 on page 12, line 4 of the specification. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

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6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: In Figure 1, reference label 10 is not mentioned. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

7. The spacing of the lines of the specification is such as to make reading and entry of amendments difficult. New application papers with lines double spaced on good quality paper are required.

8. The disclosure is objected to because of the following informalities:

On page 10, line 7, "p2" should be "P2".

In the preliminary amendment filed on 9/20/2000, it appears that applicants intend to rewrite "fuel battery" as "fuel cell" throughout the specification. However, the substitutions are incomplete in the specification as exemplified by page 10, lines 19 and 28 where the phrase "fuel battery" still appears. The applicants are encouraged to review the entire specification to complete the all changes by filing a substitute specification that is double spaced.

Appropriate correction is required.

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9. A substitute specification including the claims is required pursuant to 37 CFR 1.125(a) because the lines are not double spaced.

A substitute specification filed under 37 CFR 1.125(a) must only contain subject matter from the original specification and any previously entered amendment under 37 CFR 1.121. If the substitute specification contains additional subject matter not of record, the substitute specification must be filed under 37 CFR 1.125(b) and must be accompanied by: 1) a statement that the substitute specification contains no new matter; and 2) a marked-up copy showing the amendments to be made via the substitute specification relative to the specification at the time the substitute specification is filed.

Another reason that a substitute specification is required is the poor quality of the print as evidenced by the last line on page 12 of the specification .

10. The use of the trademark NAFION has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

11. The abstract of the disclosure is objected to because it should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art. Correction is required. See MPEP § 608.01(b).

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12. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words (15 lines maximum, rule change, effective November 7, 2000). It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

13. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C.

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122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

15. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by JP 05-074469 A.

See abstract, Figures 1-5, and paragraphs 2, 5, 7, and 8 of the machine translation of the reference.

16. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Kindler (USP 6,228,518 B1).

See Figures 3, and 6 and col. 6, lines 15-23 and col. 7, lines 20-62, col. 8, lines 15-55, and col. 9, lines 1-50 of the reference.

17. Claims 1-7, and 10 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tajima et al. (USP 4,225,654).

See col. 1, lines 30-50, col. 2, lines 22-60, and Figures 1-5 of the reference.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 05-074469 A in view of Kindler (USP 6,228,518 B1).

JP 05-074469 A discloses all the limitations of claims 7 and 10 except that a set of current collector plates are assembled respectively in contact with the first separator at an outermost side of the cell function assembly and the second separator at another outermost side of the cell function assembly.

Kindler teaches a set of current collector plates are assembled respectively in contact with the first separator at an outermost side of the cell function assembly and the second separator at another outermost side of the cell function assembly (see Figure 3 and col. 6, lines 15-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a set of current collector plates assembled respectively in contact with the first separator at an outermost side of the cell function assembly and the second separator at another outermost side of the cell function assembly to provide for an anode terminal and a cathode terminal for the cell function assembly through which electricity generated by the cell function assembly is provided to an external load.

20. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 05-074469 A in view of JP 61-253768 A.

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JP 05-074469 A discloses all the limitations of claims 11 and 12 (see paragraph 15 above) except that carbon rods (projections) are formed by pressing carbon powder, or formed by heating carbon powder containing a binder under pressure.

JP 05-074469 A only discloses that the carbon rod to be formed by sintered carbon powder (see paragraph 8 of machine translation) but does not disclose the details of how the carbon powder was sintered. The heat resistant rubber layer 15 shown in Figure 4 formed between the periphery of the carbon rods and the flat plate (see paragraph 13 of machine translation) functions as a sealing adhesive agent.

JP 61-253768 A teaches (NOTE-ORAL TRANSLATION OBTAINED FOR REFERENCE AT USPTO ON 3/25/2002) forming carbonaceous projections of a separator for a fuel cell by using raw materials comprising carbon particles and an organic granular substance (the binder) and heating (sintering) at a temperature of 100-180 °C under 1-100 kg/cm² pressure for 1-60 minutes (see page 6).

JP 61-253768 A also teaches pressing forming the raw material for the carbonaceous projections at 140 °C at 10 kg/cm² (see page 8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to press carbon powder, or heat carbon powder containing a binder under pressure to form the projections of the separator because these steps are necessary prior to sintering the carbon powder to form a sintered and coherent carbonaceous object from carbon powder.

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21. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 05-074469 A in view of Kindler (USP 6,228,518 B1) as applied to claim 7 above, and further in view of JP 61-284064 A.

JP 05-074469 A in combination with Kindler disclose all the limitations of claim 8 except that the current collecting plates are each divided into a plurality of spaced plates.

JP 61-284064 A teaches a current collecting plate located at the outermost end of the fuel cell stack (see Figure 1) that is divided into a plurality of spaced plates (see Figures 2-5) in order to increase the efficiency of current collection of the fuel cell (see abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a current collector that is divided into a plurality of spaced plates in the fuel cell of JP 05-074469 A because a fuel cell using current collectors having a plurality of spaced plates has an increased efficiency of current collection.

22. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 05-074469 A in view of Kindler as applied to claim 7 above, and further in view of JP 61-284064 A and Maget (USP 4,648,955).

JP 05-074469 A in combination with Kindler disclose all the limitations of claim 9 except that the electrode plates are each divided into a plurality of spaced plates, and the current collecting plates are each divided into a plurality of spaced plate.

JP 61-284064 A teaches a current collecting plate located at the outermost end of the fuel cell stack (see Figure 1) that is divided into a plurality of spaced plates (see Figures 2-5) in order to increase the efficiency of current collection of the fuel cell (see abstract).

Maget teaches that electrode plates divided into a plurality of spaced plates in an electrochemical cell such as a fuel cell provides for an arrangement of many individual cells in one chamber thereby eliminating many chamber walls with space savings and the arrangement also increases the voltage by a factor given by the number of spaced plates of the electrode plates on a single electrolytic membrane compared to a single plate on a single electrolytic membrane with the same gas flow rate (see abstract and col. 1, lines 9-30 and lines 50-67),

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a current collector that is divided into a plurality of spaced plates in the fuel cell of JP 05-074469 A because a fuel cell using current collectors having a plurality of spaced plates has an increased efficiency of current collection.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to have the electrode plates be divided into a plurality of spaced plates to increase the voltage output without increasing the bulk of the fuel cell which is important for small scale devices where the size of fuel cell is an important consideration as taught by Maget (col. 1, lines 40-50).

23. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (USP 4,225,654) in view of JP 61-253768 A.

Tajima et al. discloses all the limitations of claims 11 and 12 (see paragraph 17 above) except that carbon rods (projections) are formed by 1) pressing carbon powder, or 2) formed by heating carbon powder containing a binder under pressure.

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JP 61-253768 A teaches (NOTE-ORAL TRANSLATION OBTAINED FOR REFERENCE AT USPTO ON 3/25/2002) forming carbonaceous projections of a separator for a fuel cell by using raw materials comprising carbon particles and an organic granular substance (the binder) and heating (sintering) at a temperature of 100-180 °C under 1-100 kg/cm² pressure for 1-60 minutes (see page 6).

JP 61-253768 A also teaches pressing forming the raw material for the carbonaceous projections at 140 °C at 10 kg/cm² (see page 8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to press carbon powder, or heat carbon powder containing a binder under pressure to form the projections of the separator because these steps are necessary prior to sintering the carbon powder to form a sintered and coherent carbonaceous object from carbon powder.

24. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (USP 4,225,654) in view of JP 61-253768 A, Kindler (USP 6,228,518 B1), and Ida et al. (USP 5,639,403).

Tajima et al. discloses all the limitations of claims 15 and 16 (see paragraph 17 above) except that carbon rods (projections) are formed by 1) pressing carbon powder, or 2) formed by heating carbon powder containing a binder under pressure. Tajima et al. also does not disclose that the separator is manufactured by coupling the projections within the corresponding recesses formed in each cavity of molding dies and clamping the dies, and injecting melted synthetic resin into the cavity of the molding dies in a clamped condition.

Tajima et al. does disclose that the projections of the separators are carbonaceous in character and that the projections are bound carbon particles (col. 2, lines 25-30) and that the projections are integrally molded with the separators and extend through the separators (col. 1, lines 30-35) and that the separators are of a resin that can be easily molded (col. 2, lines 35-40).

JP 61-253768 A teaches (NOTE-ORAL TRANSLATION OBTAINED FOR REFERENCE AT USPTO ON 3/25/2002) forming carbonaceous projections of a separator for a fuel cell by using raw materials comprising carbon particles and an organic granular substance (the binder) and heating (sintering) at a temperature of 100-180 °C under 1-100 kg/cm² pressure for 1-60 minutes (see page 6).

JP 61-253768 A also teaches pressing forming the raw material for the carbonaceous projections at 140 °C at 10 kg/cm² (see page 8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to press carbon powder, or heat carbon powder containing a binder under pressure to form the projections of the separator because these steps are necessary prior to sintering the carbon powder to form a sintered and coherent carbonaceous object from carbon powder.

Kindler teaches that a separator comprising a flat plate with projections that can be formed by molding around the projections by injection molding (col. 7, lines 40-60) as an easily processable and less expensive way to manufacture separators (col. 7, lines 40-62).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to use injection molding to form the separator of Tajima et al. because injection molding is an easy and inexpensive way to mold the resin around the projections of the separator.

Ida et al. teaches method of molding a resin article with an embedded work piece by injection molding and clamping the mold to support the intermediate product and injecting the melted resin into the cavity of the molding dies in a clamped condition and recesses are also provided in the mold for the work pieces (see abstract; Figures 2A and 11; col. 5, lines 24-45; and col. 7, lines 1-15.)

Ida et al. and Tajima et al. are analogous art because both are concerned with integrally molding a resin article embedded by an object, which specifically in the case of Tajima et al. is the resin separator embedded by the projections.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to place the projections in the recesses formed in each cavity of molding dies, clamping the dies, and injecting melted synthetic resin into the cavity of the molding dies in a clamped condition because the recesses in the cavity of the molding dies provides for stability of the projections during the molding process of the product, and the clamped condition during injection of the melted resin provides for support of the intermediate product.

Allowable Subject Matter

25. Claims 13, 14, and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. The following is a statement of reasons for the indication of allowable subject matter:

The present invention claims a method of manufacturing a separator comprising a flat plate with a plurality of projections made of a conductive material projected from the flat plate, the flat plate being made of synthetic resin, and the step of either heating a carbon powder under pressure containing a binder to form the projections (applies to claims 13 and 17) or pressing carbon powder with a binder to form the projections and heating the projections to melt the binder (applies to claims 14 and 17) with the distinguishing feature over the prior art of heating the projections with an electric current to melt the binder contained in the projections and cooling the projections to harden them in position in the separator.

The closest prior art of record, JP 61-253768 A discloses (NOTE-ORAL TRANSLATION OBTAINED FOR REFERENCE AT USPTO ON 3/25/2002) forming carbonaceous projections of a separator for a fuel cell by using raw materials comprising carbon particles and an organic granular substance (the binder) and heating at a temperature of 100-180 °C under 1-100 kg/cm² pressure for 1-60 minutes (see page 6) but does not disclose, teach or suggest heating under supply of an electric current to melt the binder contained in the projections.

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Mukohyama et al. (USP 5,798,188, cited as an Y reference for claims 15 and 16 in the International Search Report dated 4 April 2000 for PCT/JP99/07104) discloses separator plates comprising a flat plate made of metal, metal nitride, or metal carbide and forming projections of a metal-processible polymer on the surface of the flat plate (col. 2, lines 35-50). Mukohyama et al. was not applied as a reference against claims 15 and 16 because it does not disclose, teach or that the flat plate is made of a synthetic resin as cited in claim 4 from which claims 15 and 16 depend.

Conclusion

27. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/8 April 2002

Susy Tsang-Foster